

REMARKS

Claims 1, 2, 4-16, and 17 are now pending in the application. Claims 1, 6, and 17 have been amended to include the limitation of the blowing agent gas being released from within the precursor material and into an ambient environment of a forming tool cavity. Support for the amendments and specific remarks in support thereof are detailed later herein. The Examiner is respectfully requested to consider the remarks contained herein.

REJECTION UNDER 35 U.S.C. § 112

Claims 1-2, 4-14, and 16-17 stand rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point and distinctly claim the subject matter which Applicants regard as the invention. This rejection is respectfully traversed.

Applicants point out that Claims 1, 6, and 17 have been amended to include the limitation of the blowing agent gas being released from within the precursor material and into an ambient environment of a forming tool cavity. Although Applicants maintain that arguments in the response filed May 10, 2006 provided sufficient detail and citations to support those claim amendments, the present amendments are submitted to provide supplemental clarity and to alleviate the Examiner's concern regarding support for the amendments.

The present amendments are supported throughout the Specification, at least at Paragraphs [0014] through [0018]. Paragraphs [0014] and [0015] indicate that the precursor materials are placed in a forming tool or die having a cavity. Paragraph

[0016] of the Specification states, "The blowing agent in the precursor element decomposes and releases a gas; and the gas forces the compacted precursor material to expand into foam, thus forming a highly porous structure for the final foam product." To be highly porous requires pores or interconnected openings throughout the structure, including at the surface of the structure. The internal pores and the surface pores of the highly porous structure allow for the gas to be released from within the blowing agent material, through the adjacent precursor materials, and into the ambient environment of the forming tool cavity.

Additionally, Paragraph [0018] of the Specification states, "The heated interim composite is sustained at the foaming temperature for a time sufficient to foam the metal foam precursor portion into the desired shape and to shape the metallic layers by the introduction of forming air or a forming non-reactive gas in the die cavity. The desired shape is achieved after the metallic foam expands to the point where the forming tool cavity restricts the foam growth." The highly porous foam is formed by releasing the blowing agent gas from in the precursor materials and releasing the gas into the ambient environment of the forming tool or die cavity. The release and subsequent circulation of the blowing agent gas in the forming tool or die cavity provides the "highly porous" characteristic to the materials and pushes the materials against the forming tool cavity to restrict further foam expansion.

Paragraph [0018] goes on to state that the foam and subsequently, the final product are shaped by the "introduction of forming air or a forming non-reactive gas in the die cavity." The highly porous structure of the foam and the conditions of the forming tool facilitate circulation of the forming air or forming non-reactive gas

introduced into the cavity. This allows for appropriate pressure to be applied to the sheet metal for plastic deformation.

Applicants believe that these remarks and clarifying amendments address the Examiner's concern regarding support for the amendments.

DOUBLE PATENTING REJECTION

Claims 1-2, 4-14, 16 and 17 stand provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over Claims 1-11 and 19-24 of co-pending Application No. 10/738,345 in view of Rashid (U.S. Patent No. 6,253,588) and Seeliger (U.S. Patent 6,090,232). Applicants respectfully traverse the characterization that there is no patentable distinction between Applicants' claimed invention and the cited references. As the double patenting rejection is provisional, Applicants will forego the submission of a terminal disclaimer at this time.

REJECTION UNDER 35 U.S.C. § 103

Claims 1-2, 4-14, and 16-17 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Seeliger (U.S. Pat. No. 6,090,232) in view of Baumeister (U.S. Pat. No. 5,151,246) and further in view of Rashid (U.S. Patent 6,253,588). This rejection is respectfully traversed.

The Examiner has characterized the deformable metal sheet of Rashid as being suitable for combination with precursor foam core panels. Applicants respectfully traverse the characterization. Applicants assert that a skilled metallurgist would not assume that the imposition of an intermediate layer of a metal foam precursor or a

metal foam between the high pressure gas source and the deformable metal sheet would function to provide quick plastic deformation of the metal sheet. Applicants further assert the Examiner has not provided the requisite motivation to combine the references. The processes and parameters disclosed in Rashid are specific to quick plastic formation which is highly dependent on materials selected, air flow across the metal sheet, pressure applied to the metal sheet, and other processing variables.

Further, independent claims 1, 6, 11, and 17 have been amended to include the metal foam precursor being adapted to allow a blowing agent gas to be released from within the metal foam precursor and into an ambient environment.

The combination of Seeliger and/or Rashid with Baumeister does not teach or suggest Applicants claimed invention as amended. Baumeister discloses forming a layered metal foam precursor consisting of a layer of propellant free metal powder, a layer of propellant containing metal powder (for example, titanium hydride), and another layer of propellant free metal powder. The layered metal foam precursor is compacted to form a blank and the blank is foamed to form a “predominantly closed porosity” metal body (column 7, lines 4-15; column 4, lines 48 to 50). “Predominantly closed porosity” requires that the propellant free metal permanently encapsulate and entrap the propellant (gas emitted from the titanium hydride). The predominantly closed porosity is noted as making the metal foam able to float in water (column 4, line 50) due to the gas from the propellant containing metal powder being entrapped in the propellant free metal powder.

The predominantly closed porosity is achieved by the use of specific combinations of propellant free metal powders and propellant containing metal powders,

powder ratios, and highly tailored processing parameters. The propellant free metal powder particles are joined through diffusion at a pressure which is sufficiently high to "hinder the decomposition of the propellant in such fashion that the metal particles are permanently bonded to one another and form a gas-tight seal for the gas particles of the propellant". Accordingly, Baumeister teaches and suggests trapping the blowing agent gas.

Baumeister is not combinable with Seeliger for several reasons. First, the encapsulation and entrapment suggest and taught by Baumeister is not combinable with the sheet metals disclosed in Seeliger. Sheet metal used according to the parameters of Baumeister will not adequately diffuse around the propellant containing metal powders to provide the predominantly closed porosity. The materials disclosed in Seeliger would not provide the gas-tight seal as sheet metal cannot deform to effectively encapsulate each discrete unit of the propellant containing metal powder and provide the closed porosity.

Second, the methods disclosed in Seeliger do not facilitate the use of the Baumeister parameters. Seeliger teaches that the shaped component is formed by disposing the foaming precursor materials between two pieces of sheet metal in a mold. The materials are pressed together to form metallic bonds between the foamed layer and the solid metal sheets. The foaming precursor materials are foamed after the metallic bonds are formed between the sheets and the foaming precursor materials. In other Seeliger embodiments, the precursor materials are attached to a single metal sheet to form metallic bonds and then the foaming precursor materials are foamed (column 2, line 49 through column 3, line 12). All methods taught or suggested in

Seeliger allows for release of the propellant gas. The release of gas (or lack of encapsulation) is accommodated by the mold which includes adjustability features to allow for the foaming and gas emission from within the foaming precursor materials and the mold (column 3, line 42 through column 4, line 14). To employ the Baumeister principles to provide closed porosity to Seeliger which allows for adjustability due to gas release is an improper obviousness rejection because the combination requires substantial reconstruction of the Baumeister processes and principles. (See *In re Ratti*, 123 U.S.P.Q. 349 (C.C.P.A. 1951)).

In addition to the assertions above, the combination of Baumeister and/or Seeliger with Rashid still fails to teach or disclose Applicants' claimed invention as amended. Rashid is directed to quick plastic forming and neither provides the parameters lacking in Seelinger nor does it provide direction as to correcting or otherwise implementing the teachings of Baumeister.

Because the combinations of Seeliger and/or Rashid and Baumeister do not teach or suggest Applicants' claimed inventions as amended, reconsideration and withdrawal of the 103(a) rejections are respectfully requested.

CONCLUSION

It is believed that all of the stated grounds of rejection have been properly traversed, accommodated, or rendered moot. Applicants therefore respectfully request that the Examiner reconsider and withdraw all presently outstanding rejections. It is believed that a full and complete response has been made to the outstanding Office Action and the present application is in condition for allowance. Thus, prompt and

favorable consideration of this amendment is respectfully requested. If the Examiner believes that personal communication will expedite prosecution of this application, the Examiner is invited to telephone the undersigned at (248) 641-1600.

Respectfully submitted,

By: 

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